



p: tac

AAATGAGCTG TTGACAATTA ATCATCGGCT CGTATAATGT GTGGAATTGT GAGCGGATAA  
EcoRI SacI KpnISmaI  
CAATTTTACA CAGGAAACAG AATTCGAGCT CGGTACCCGG GCTACATGGA GATTA ACTCA  
RBS | -> α-globin  
ATCTAGAGGG TATTAATAAT GTATCGCTTA AATAAGGAGG AATAACATAT GGTGCTGTCT  
CCTGCCGACA AGACCAACGT CAAGGCCGCC TGGGGTAAGG TCGGCGCGCA CGCTGGCGAG  
TATGGTGCGG AGGCCCTGGA GAGGATGTTT CTGTCCTTCC CCACCACCAA GACCTACTTC  
CCGCACTTCG ATCTGAGCCA CGGCTCTGCC CAGGTTAAGG GCCACGGCAA GAAGGTGGCC  
GACGCGCTGA CCAACGCCGT GGCGCACGTG GACGACATGC CCAACGCGCT GTCCGCCCTG  
AGCGACCTGC ACGCGCACAA GCTTCGGGTG GACCCGGTCA ACTTCAAGCT CCTAAGCCAC  
TGCCTGCTGG TGACCCTGGC CGCCCACCTC CCCGCCGAGT TCACCCCTGC GGTGCACGCC  
->|  
TCCCTGGACA AGTTCCTGGC TTCTGTGAGC ACCGTGCTGA CCTCCAAATA CCGTTAAACT  
RBS | -> β-globin  
AGAGGGTATT AATAATGTAT CGCTTAAATA AGGAGGAATA ACATATGGTG CACCTGACTC  
CTGAGGAGAA GTCTGCCGTT ACTGCCCTGT GGGGCAAGGT GAACGTGGAT GAAGTTGGTG  
GTGAGGCCCT GGGCAGGCTG CTGGTGGTCT ACCCTTGGAC CCAGAGGTTC TTTGAGTCCT  
TTGGGGATCT GTCCACTCCT GATGCTGTTA TGGGCAACCC TAAGGTGAAG GCTCATGGCA  
AGAAAGTGCT CGGTGCCTTT AGTGATGGCC TGGCTCACCT GGACAACCTC AAGGGCACCT  
TTGCCACACT GAGTGAGCTG CACTGTGACA AGCTGCACGT GGATCCTGAG AACTTCAGGC  
β108Asn->Gln  
TCCTGGGACA AGTACTGGTC TGTGTGCTGG CCCATCACTT TGGCAAAGAA TTCACCCAC  
CAGTGCAGGC TGCCTATCAG AAAGTGGTGG CTGGTGTGGC TAATGCCCTG GCCCACAAGT  
->| SphI rrB(5S, T1, T2)  
ATCACTAAGC ATGCATCTGT TTTGGCGGAT GAGAGAAGAT TTTGAGCCTG ATACAGATTA  
NsiI

FIG 1A

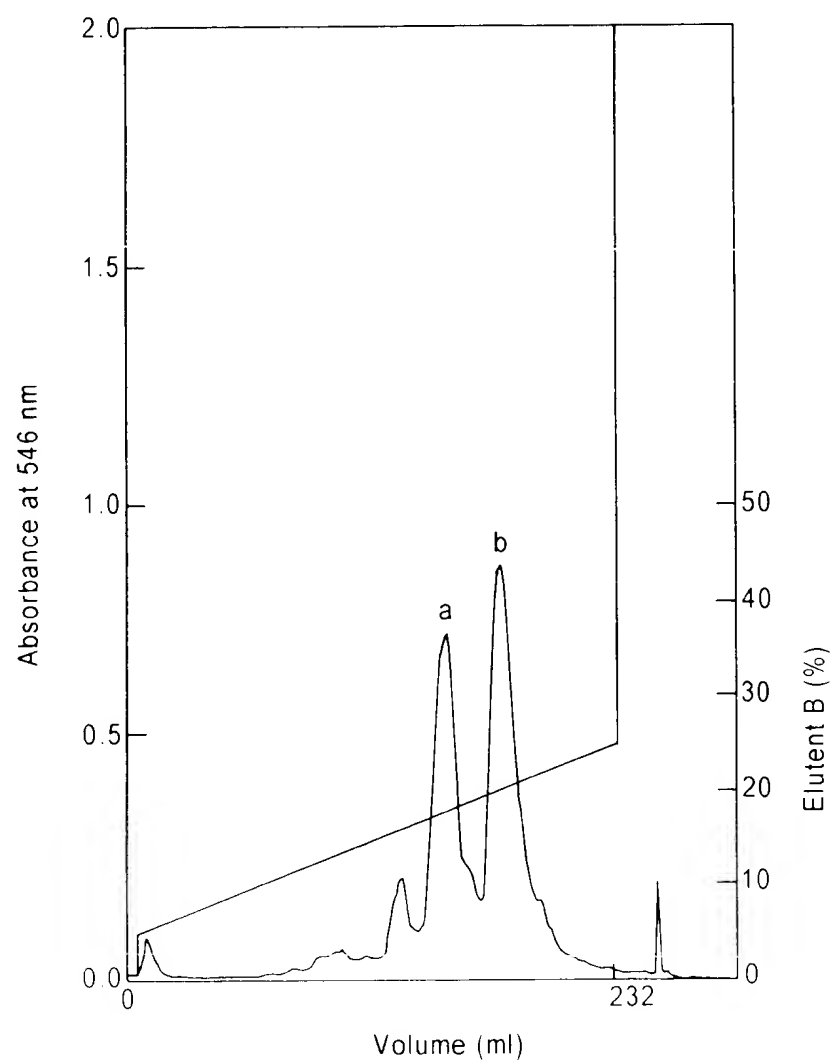
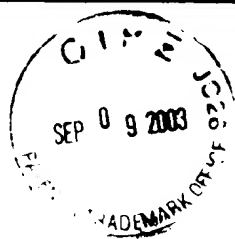


p: tac

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AAATGAGCTG TTGACAATTA ATCATCGGCT CGTATAATGT GTGGAATTGT GAGCGGATAA  
EcoRI SacI KpnISmaI  
CAATTTTACA CAGGAAACAG AATTCGAGCT CGGTACCCGG GCTACATGGA GATTAACTCA  
RBS | -> α-globin  
ATCTAGAGGG TATTAATAAT GTATCGCTTA AATAAGGAGG AATAACATAT GGTGCTGTCT  
CCTGCCGACA AGACCAACGT CAAGGCCGCC TGGGGTAAGG TCGGCGCGCA CGCTGGCGAG  
TATGGTGCGG AGGCCCTGGA GAGGATGTTC CTGTCTTTCC CCACCAACCA GACCTACTTC  
CCGCACTTCG ATCTGAGCCA CGGCTCTGCC CAGGTTAAGG GCCACGGCAA GAAGGTGGCC  
GACGCGCTGA CCAACGCCGT GCGCACGTG GACGACATGC CCAACGCGCT GTCCGCCCTG  
AGCGACCTGC ACGCGCACA GCTTCGGGTG GACCCGGTCA ACTTCAAGCT CCTAAGCCAC  
TGCCTGCTGG TGACCCTGGC CGCCCACCTC CCCGCCGAGT TCACCCCTGC GGTGCACGCC  
TCCCTGGACA AGTTCCTGGC TTCTGTGAGC ACCGTGCTGA CCTCCAAATA CCGTTAAACT  
RBS | -> β-globin  
AGAGGGTATT AATAATGTAT CGCTTAAATA AGGAGGAATA ACATATGGTG CACCTGACTC  
CTGAGGAGAA GTCTGCCGTT ACTGCCCTGT GGGGCAAGGT GAACGTGGAT GAAGTTGGTG  
GTGAGGCCCT GGGCAGGCTG CTGGTGGTCT ACCCTTGGAC CCAGAGGTTT TTTGAGTCCT  
TTGGGGATCT GTCCACTCCT GATGCTGTTA TGGGCAACCC TAAGGTGAAG GCTCATGGCA  
AGAAAGTGCT CGGTGCCTTT AGTGATGGCC TGGCTCACCT GGACAACCTC AAGGGCACCT  
TTGCCACACT GAGTGAGCTG CACTGTGACA AGCTGCACGT GGATCCTGAG AACTTCAGGT  
β105Leu->Trp  
GGCTAGGCAA CGTGCTGGTC TGTGTGCTGG CCCATCACTT TGGCAAAGAA TTCACCCAC  
CAGTGCAGGC TGCCTATCAG AAAGTGGTGG CTGGTGTGGC TAATGCCCTG GCCCACAAGT  
->|SphI rxB(5S,T1,T2)  
ATCACTAAGC ATGCATCTGT TTTGGCGGAT GAGAGAAGAT TTTCAGCCTG ATACAGATTA  
NsiI  
.....

FIG 1R



**FIG. 2A**

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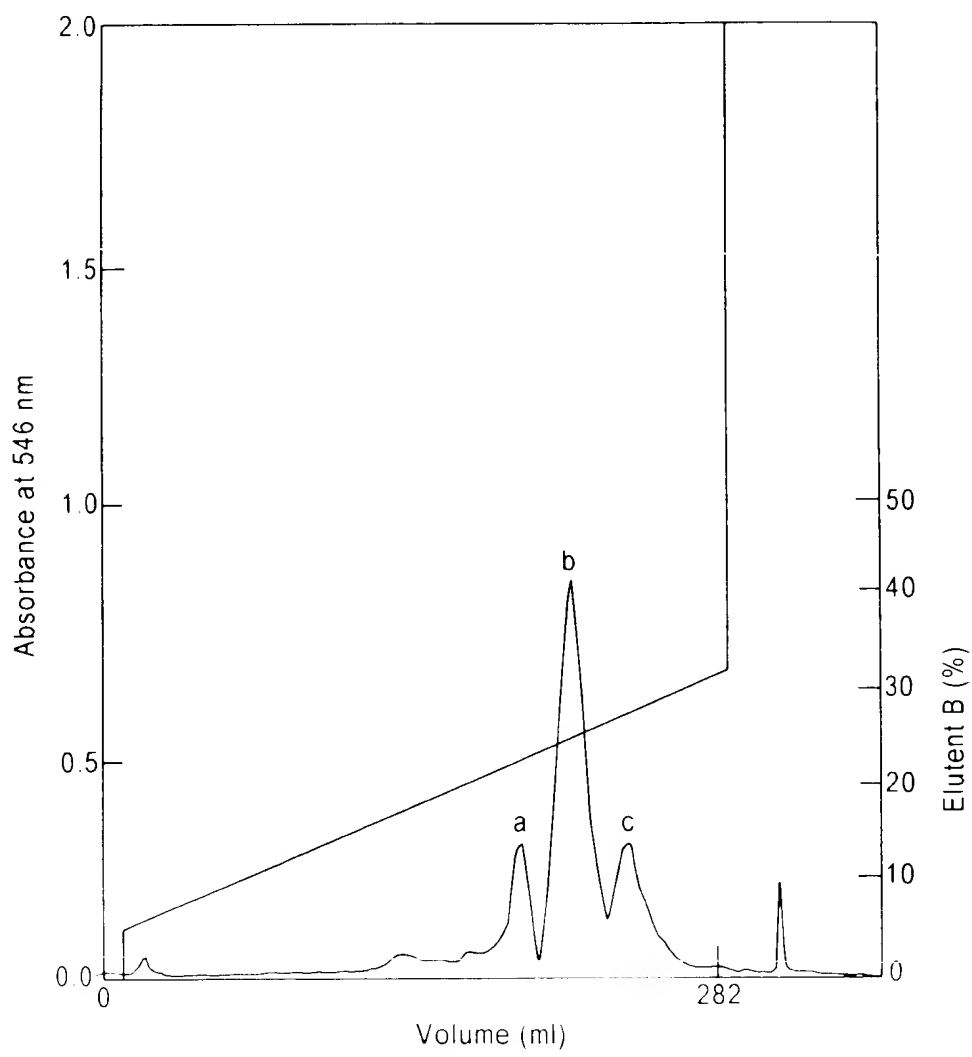


FIG. 2B

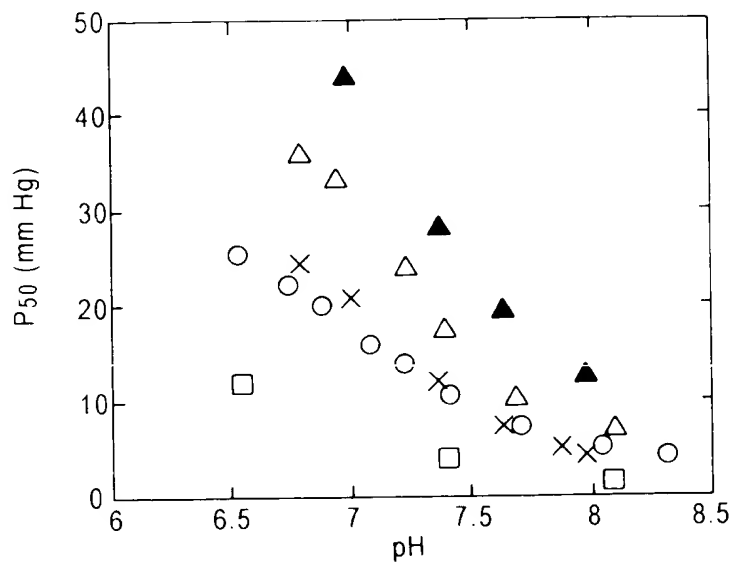
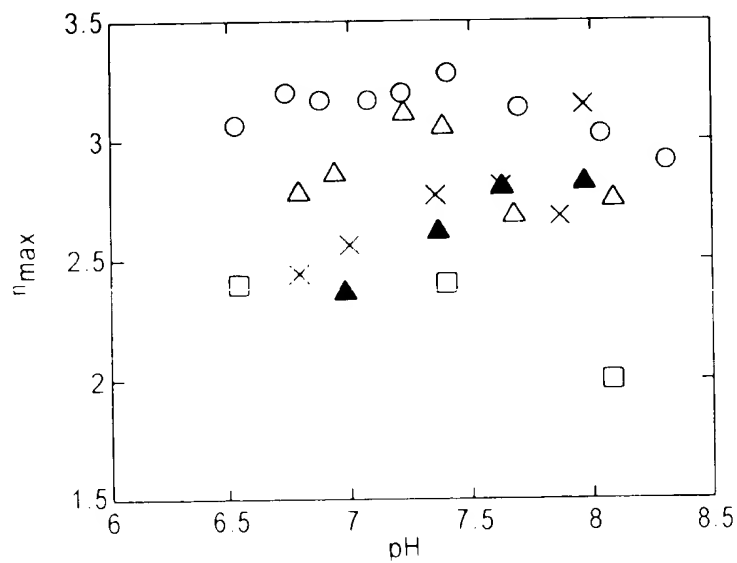


FIG. 3A



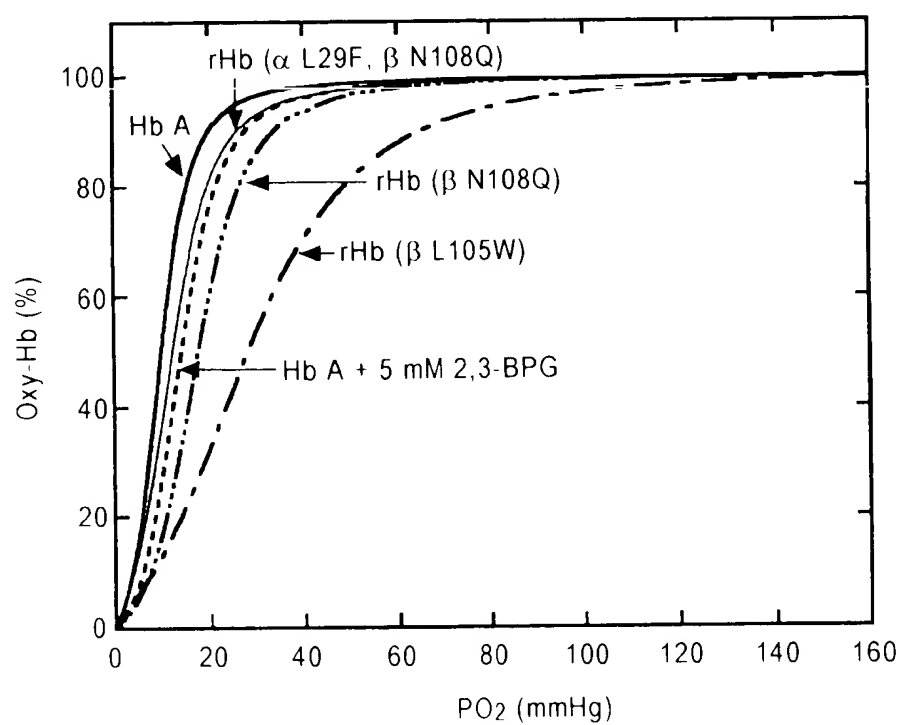
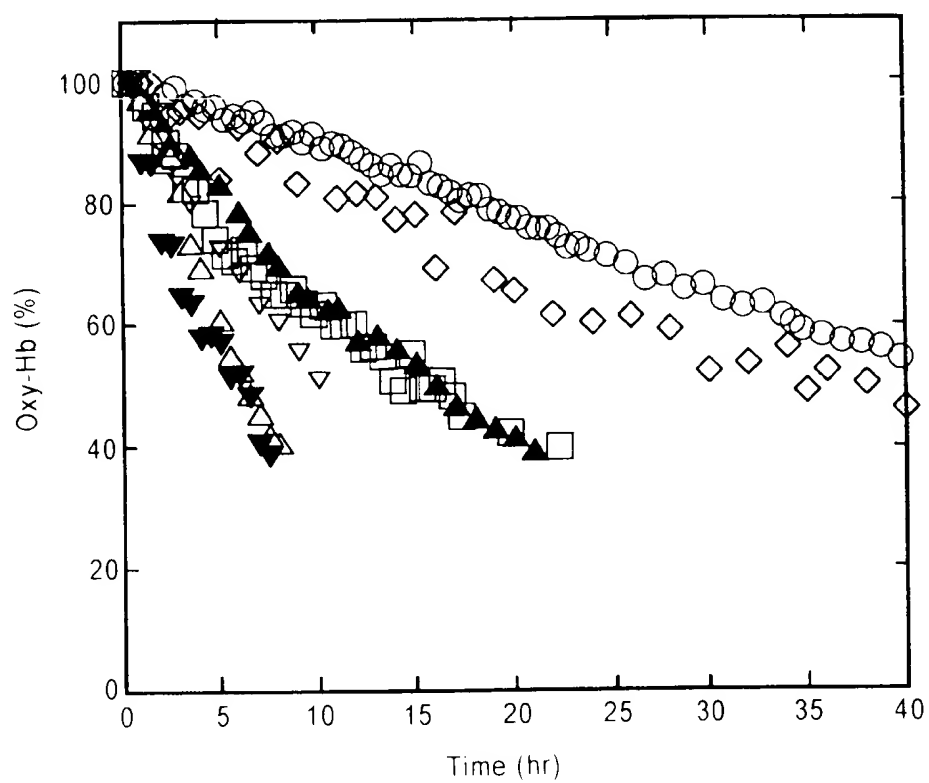
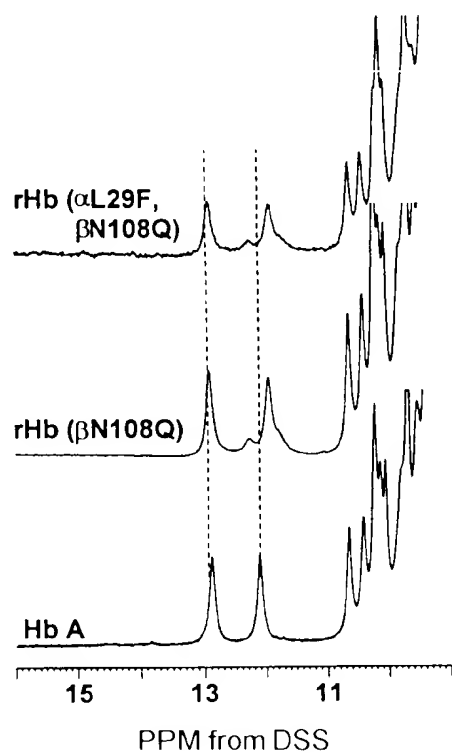


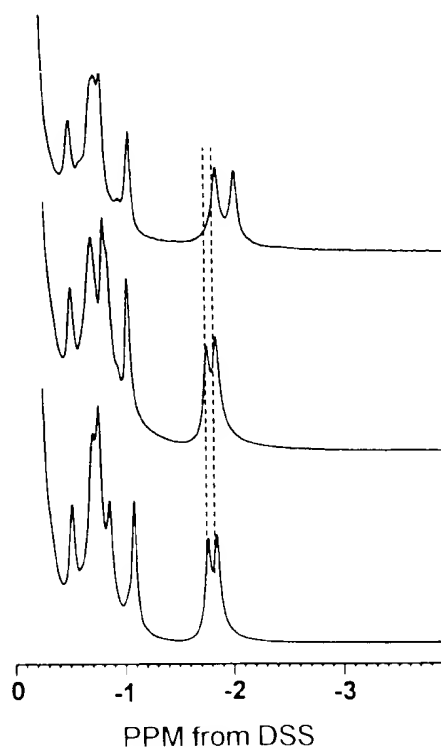
FIG. 4



**FIG. 5**



**FIG. 6A**



**FIG. 6B**



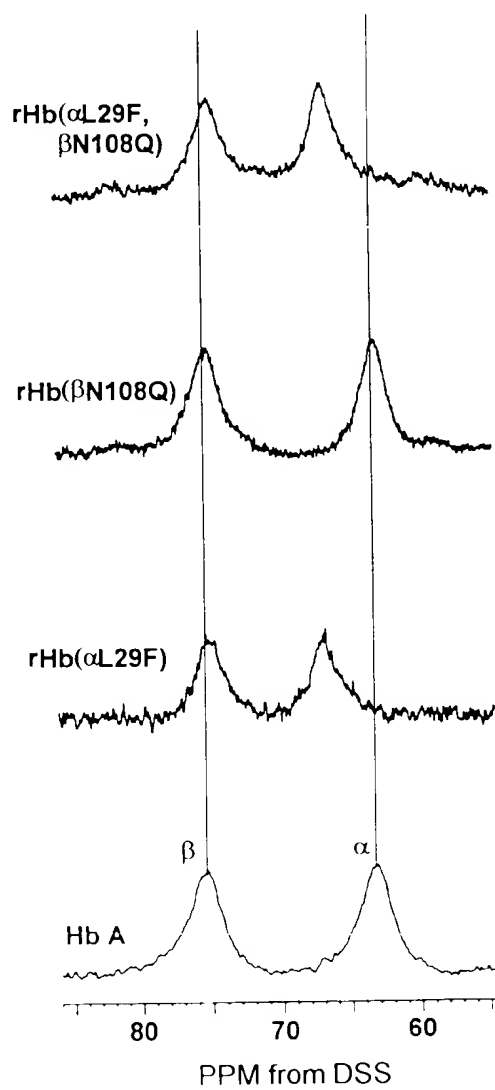


FIG. 7A

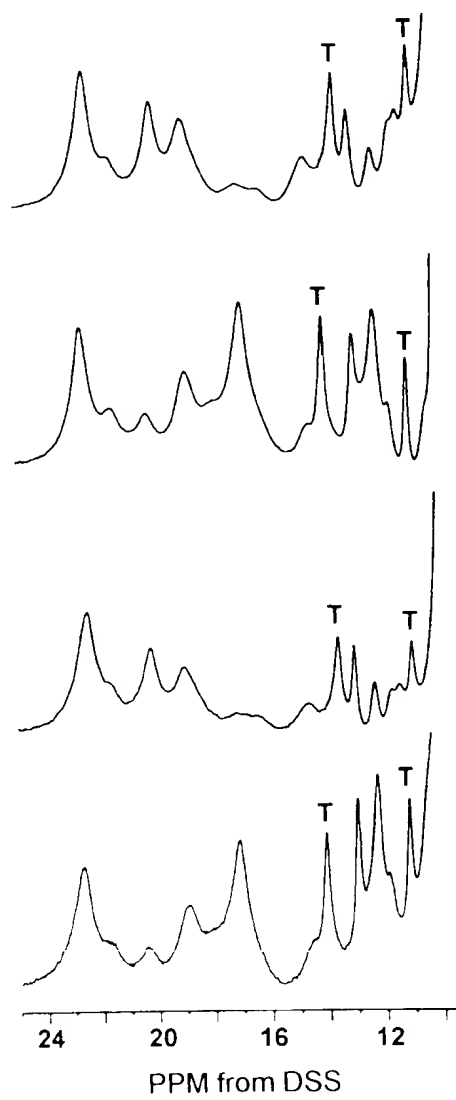
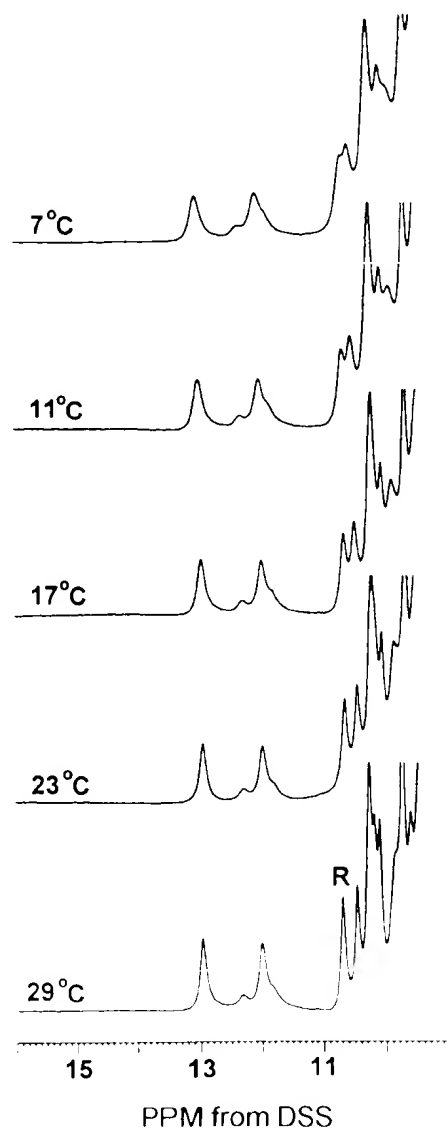
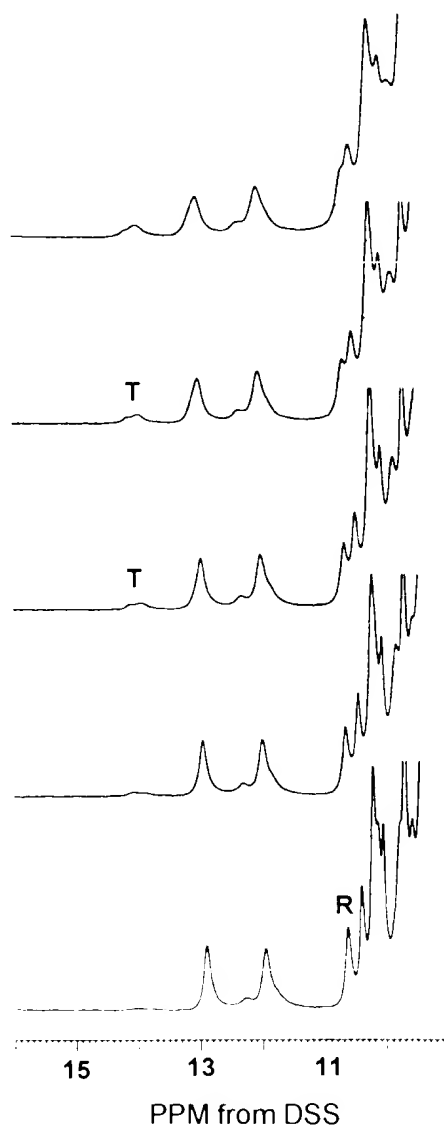


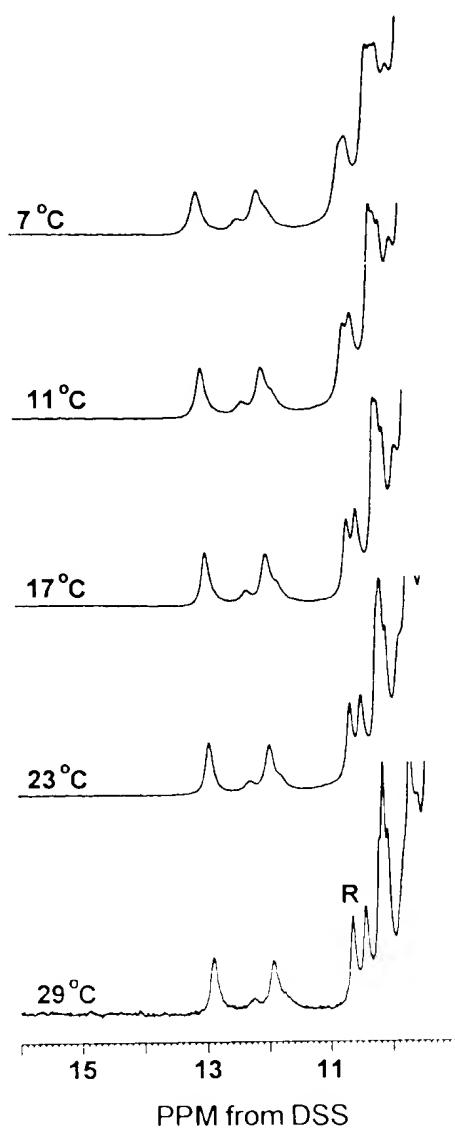
FIG. 7B



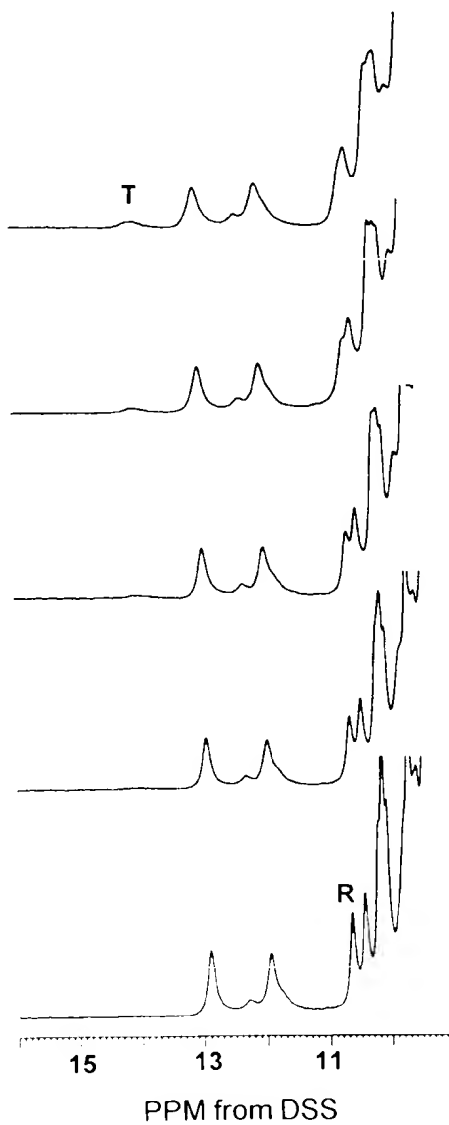
**FIG. 8A**



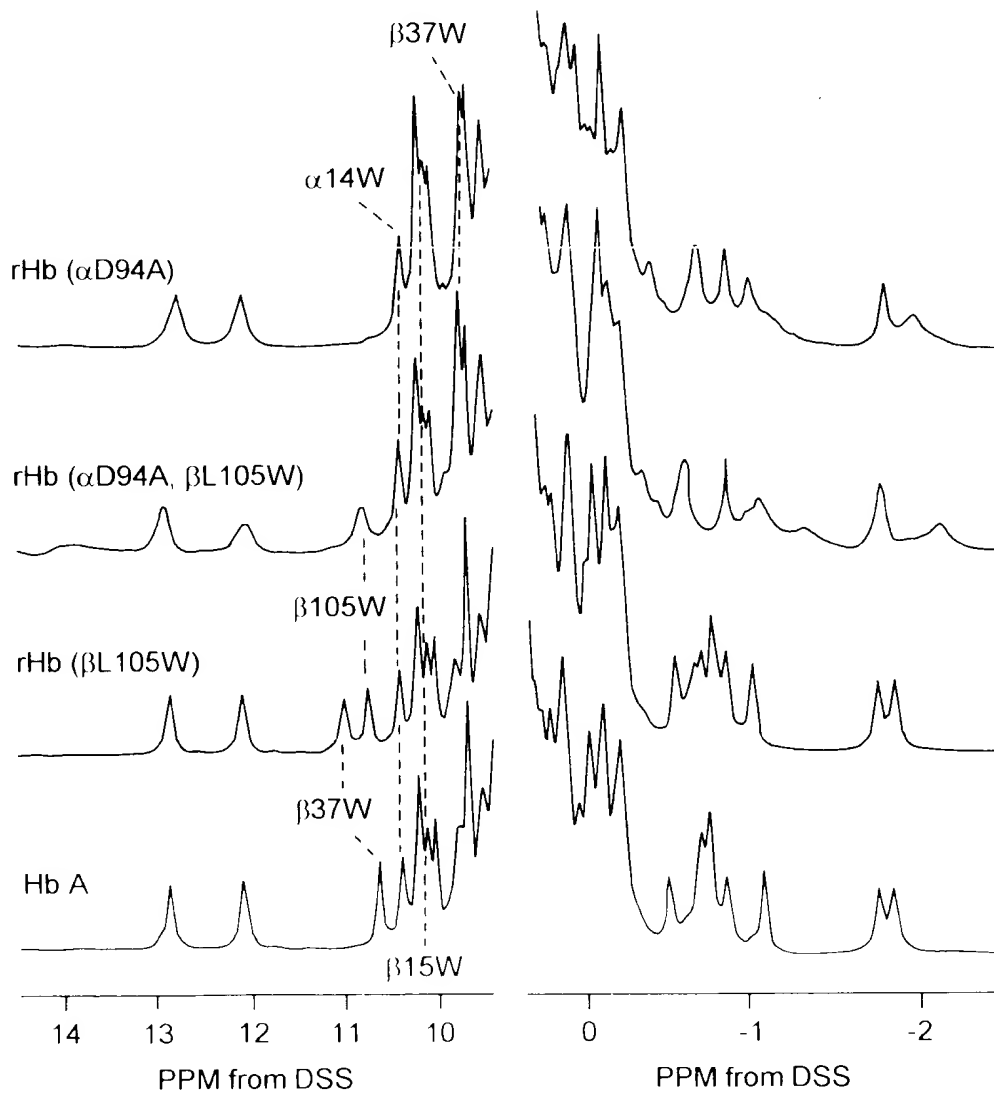
**FIG. 8B**



**FIG. 9A**



**FIG. 9B**



**FIG. 10A**

**FIG. 10B**



FIG. 11A

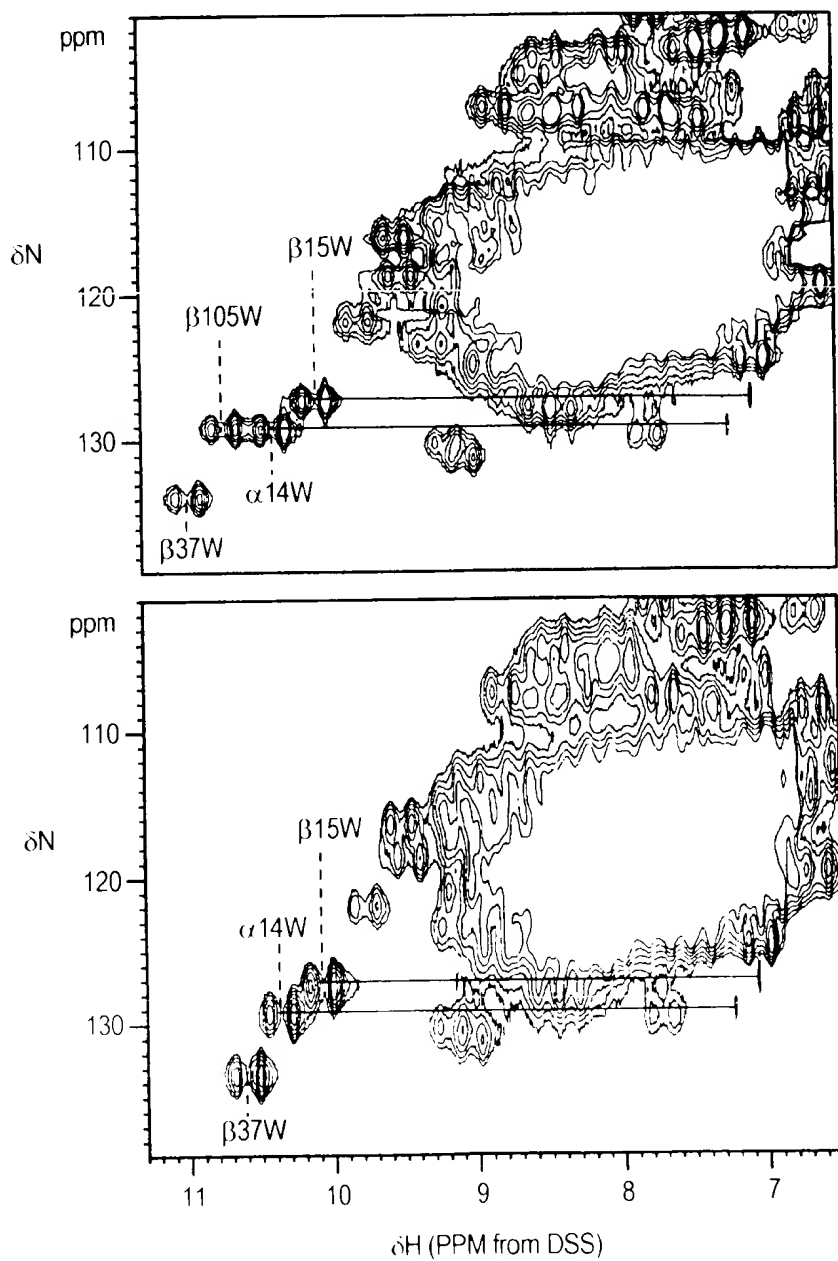




FIG. 12A

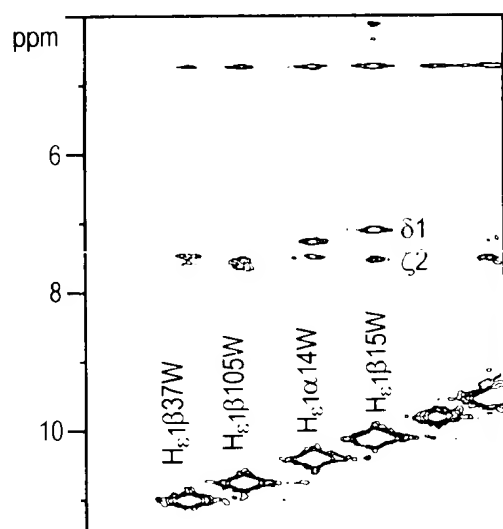
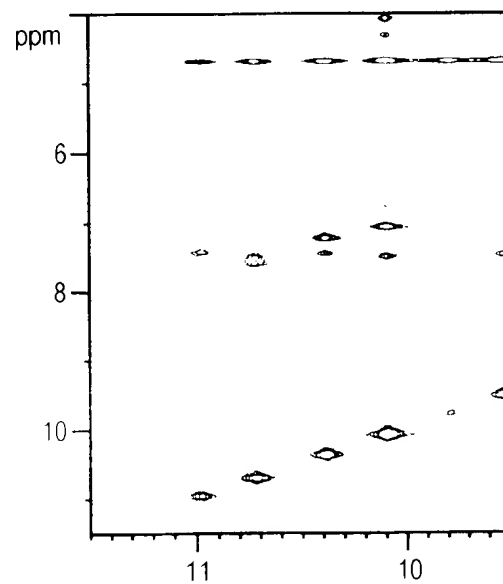
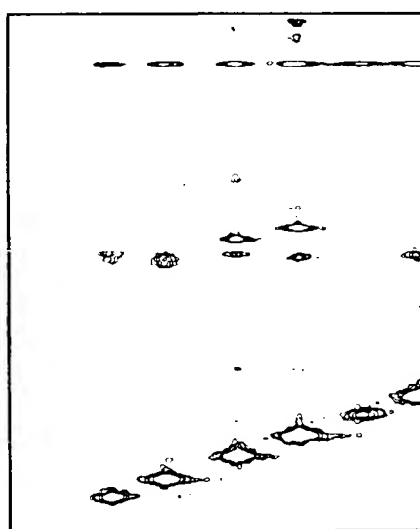
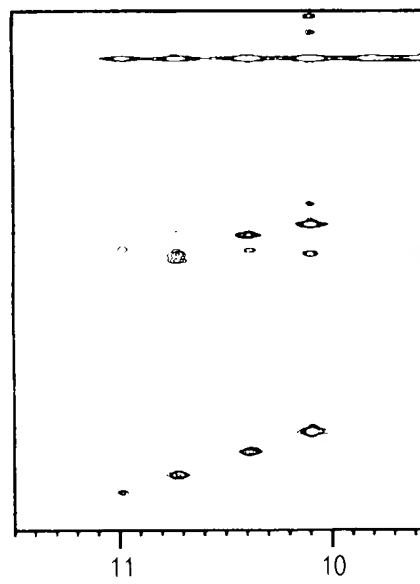


FIG. 12B



PPM from DSS

FIG. 12C



PPM from DSS

FIG. 12D

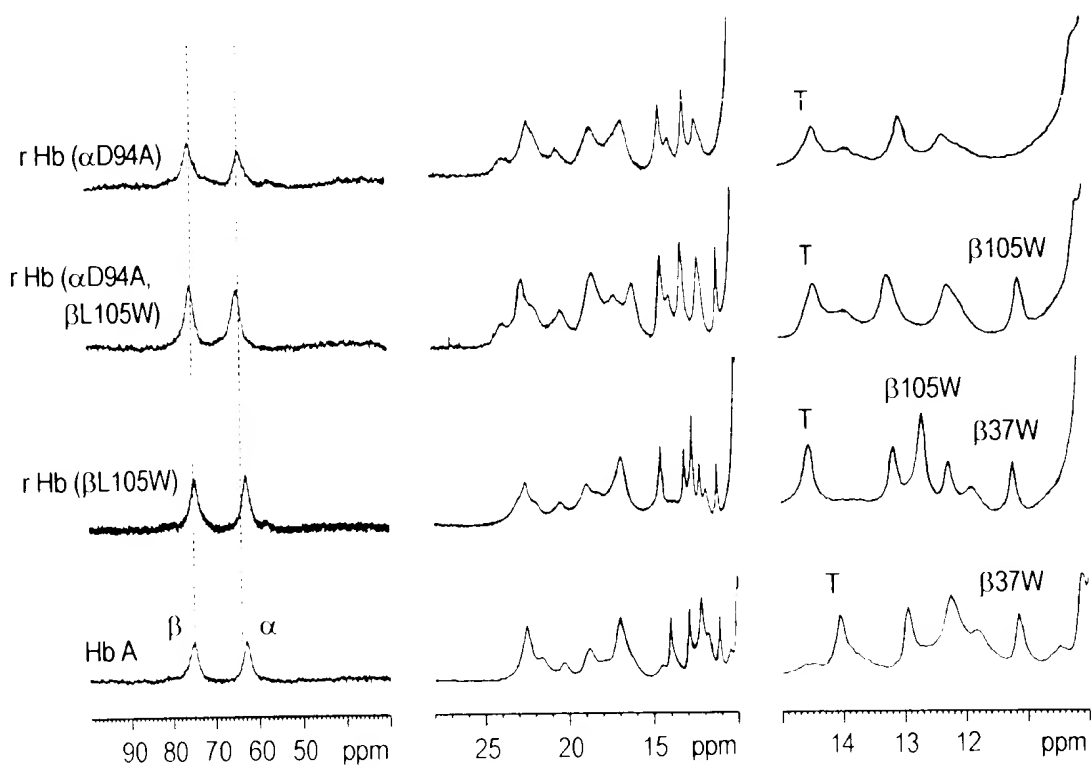
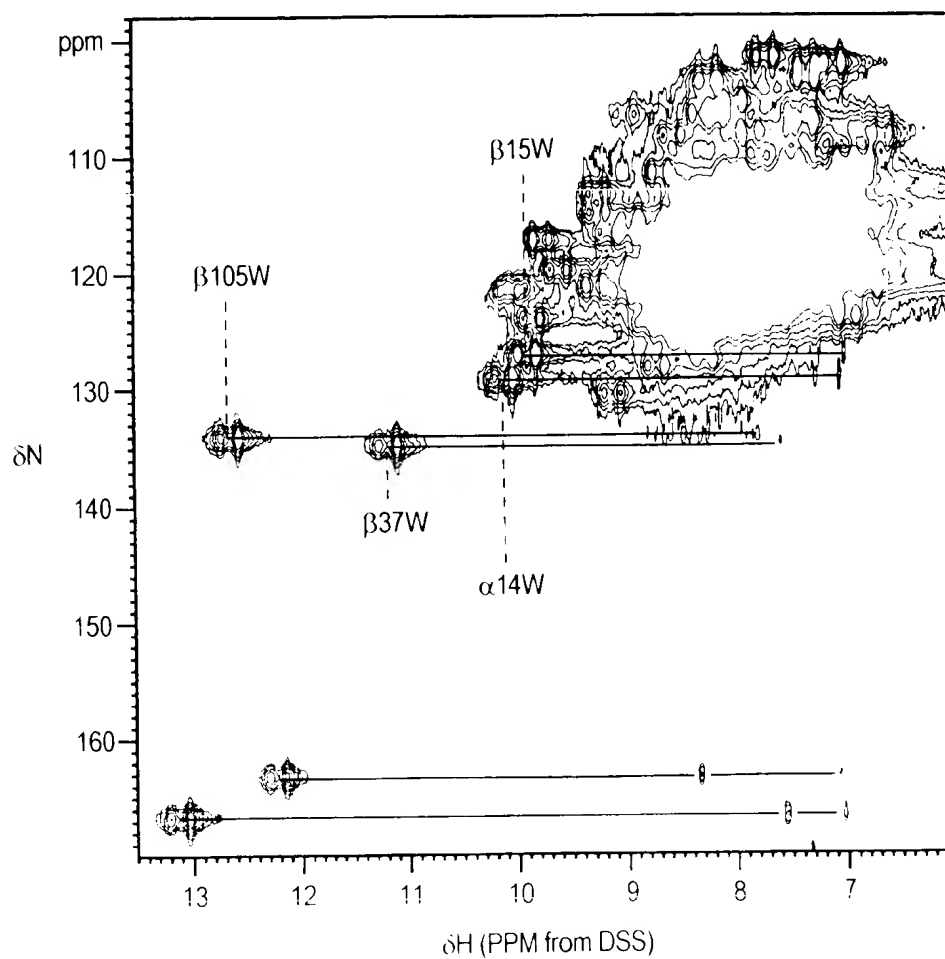


FIG. 13A

FIG. 13B

FIG. 13C



**FIG. 14**





FIG. 15A

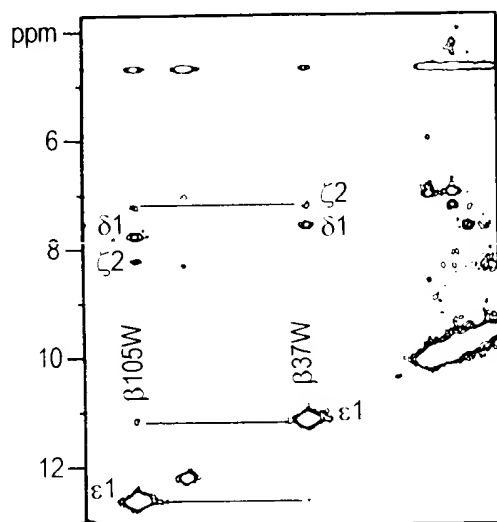


FIG. 15B

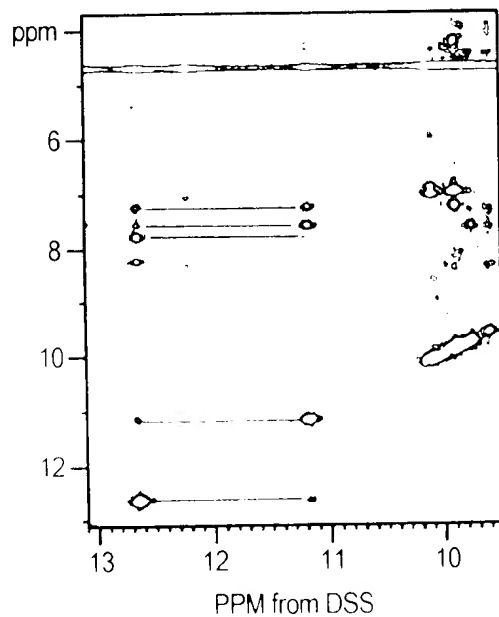
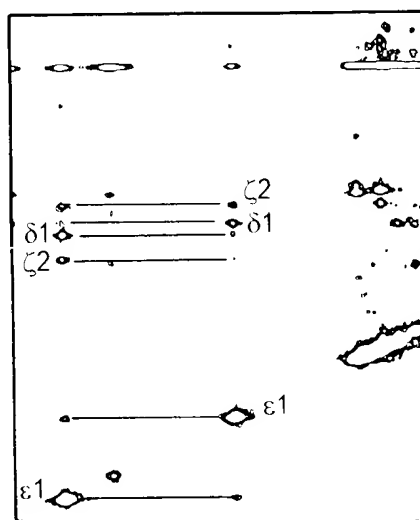


FIG. 15C

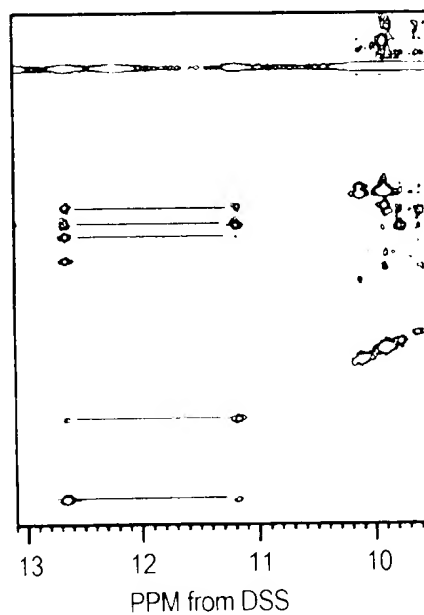
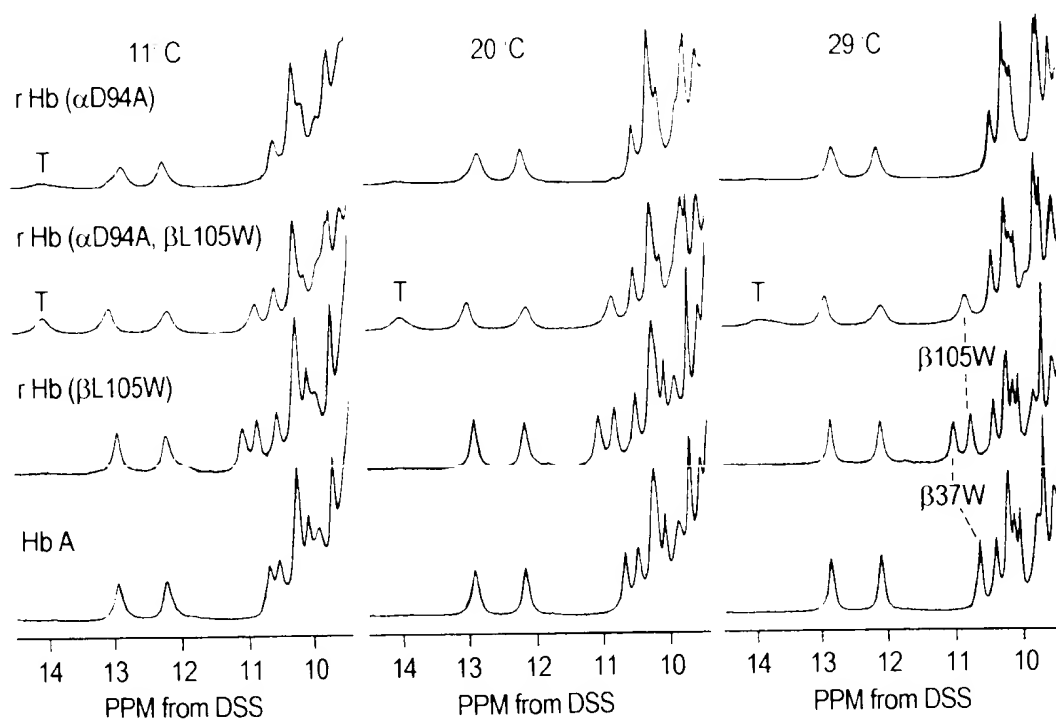
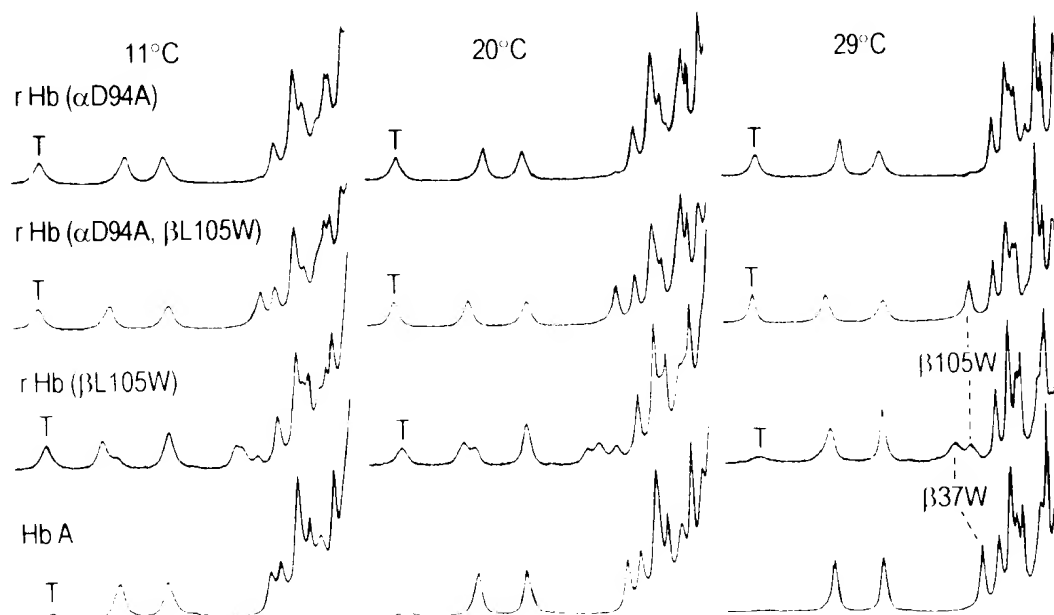


FIG. 15D



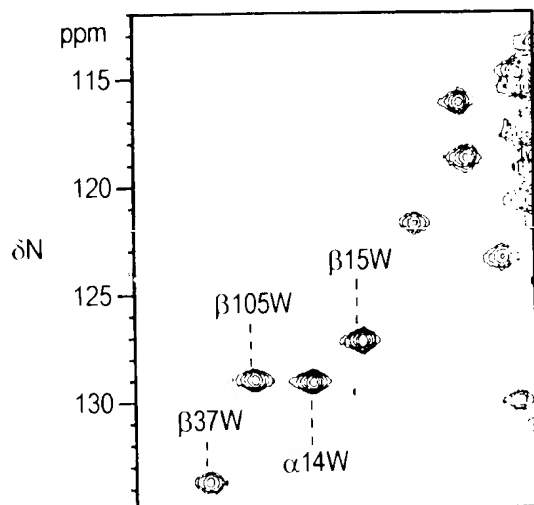
**FIG. 16A**



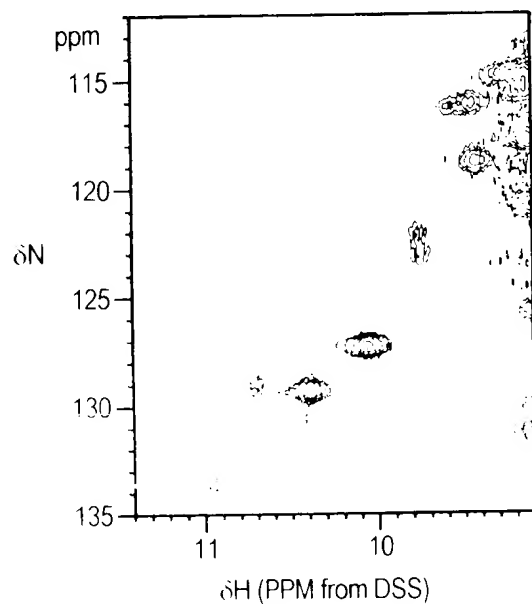
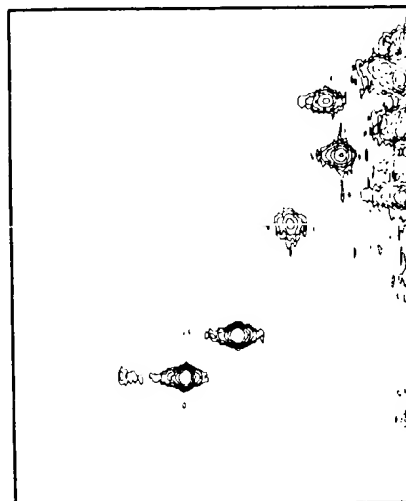
**FIG. 16B**



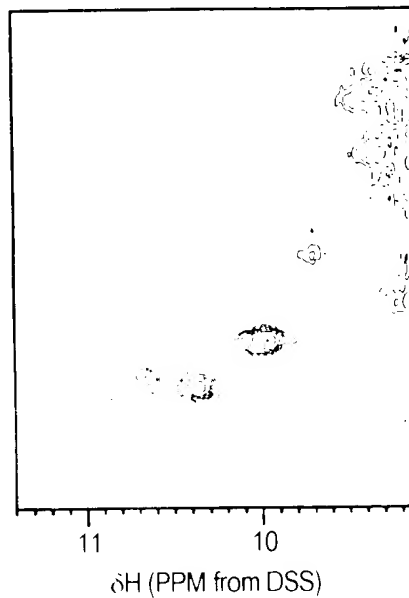
**FIG. 17A**



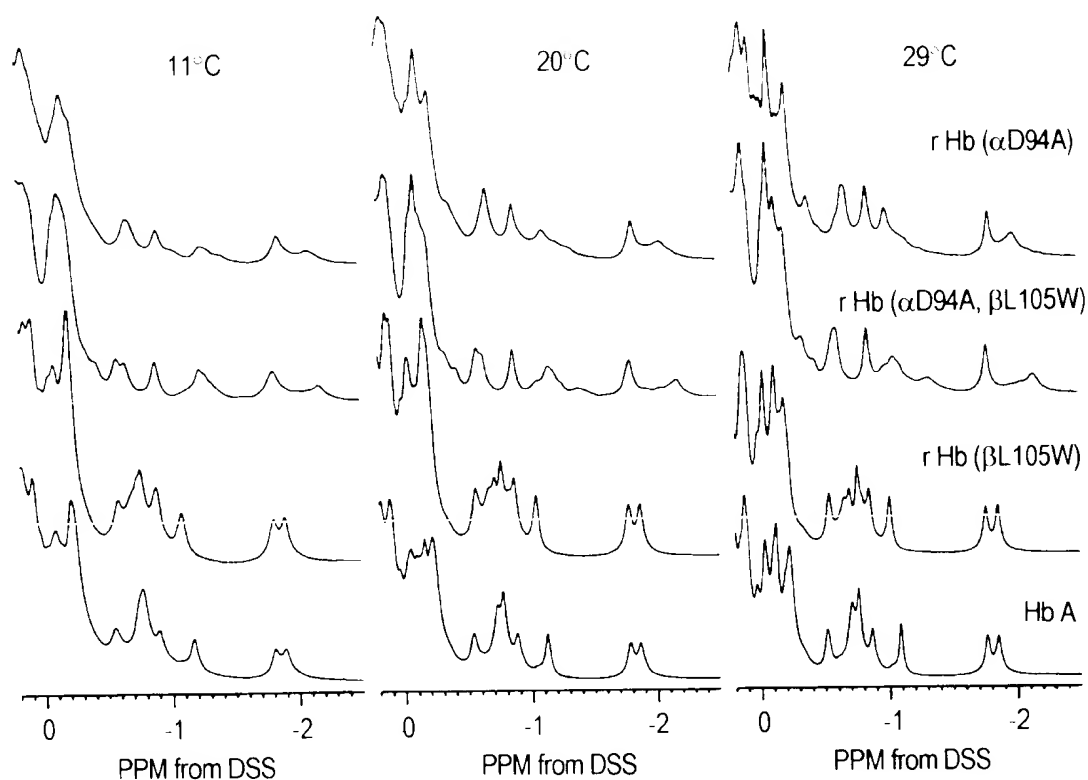
**FIG. 17B**



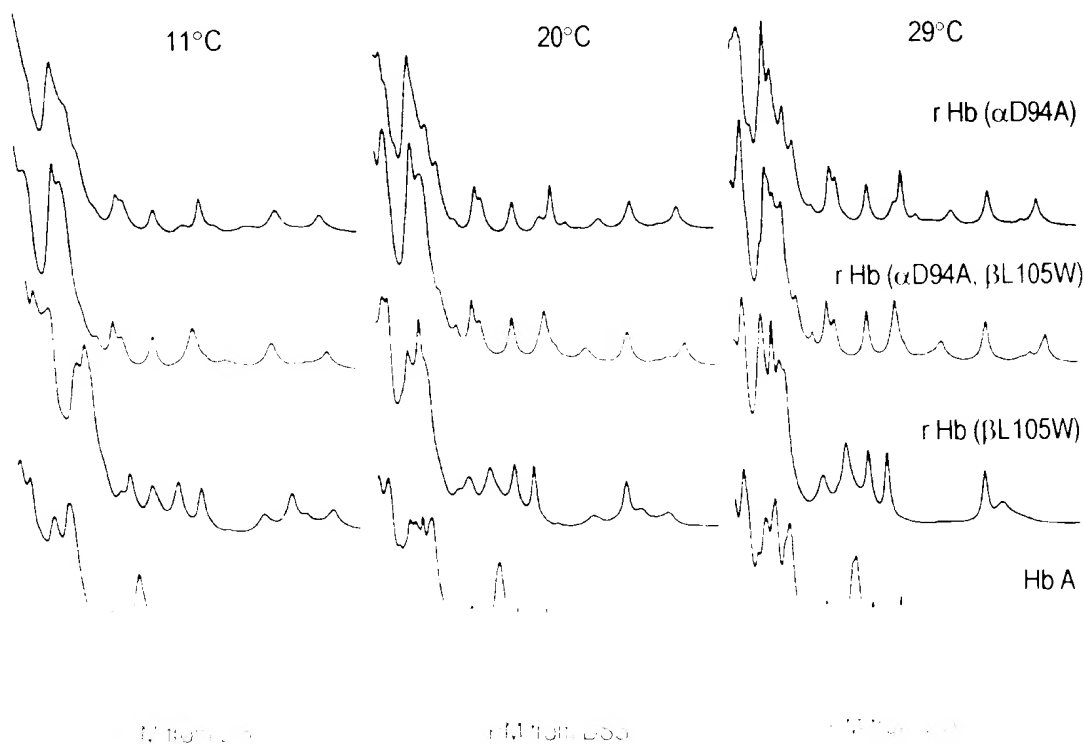
**FIG. 17C**



**FIG. 17D**



**FIG. 18A**



**FIG. 18B**